

THE APOCYNACEÆ OF AFRICA. I : TABERNÆMONTANA L.  
I. INTRODUCTORY REMARKS TO A REVISION OF THE SPECIES  
REPRESENTED IN AFRICA

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RÉSUMÉ : Quelques remarques introductives sur le grand genre pantropical *Tabernæmontana*, dont les espèces africaines seront révisées par l'auteur dans un travail en préparation. Une liste des synonymes du genre avec leurs espèces-types est donnée.

ABSTRACT: This publication gives some introductory remarks on the large pantropical genus *Tabernæmontana*, the African species of which will be revised in a forthcoming revision. A list of synonyms of the genus with their type species is added.

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INTRODUCTION

The present publication is the first in a series of revisions of the *Apocynaceæ* represented in Africa. The author made field observations on *Apocynaceæ* and *Loganiaceæ* and collected material of them for some years in West Africa and Cameroun. He started revising the *Apocynaceæ* shortly after discussing the subject with several colleagues, among whom the Directors and Keepers of the herbaria of Brussels, Kew, and Paris at the A.E.T.F.A.T. Congress at München in September 1970. At present most of his revisions of the *Loganiaceæ* (LEEUWENBERG, 1969, 1971, 1975) have been published. As he prefers to conclude the work on the *Loganiaceæ* first, he has as yet not published anything on the *Apocynaceæ*. Unfortunately just recently some scientifically badly founded publications appeared which unnecessarily burden the nomenclature of the plants they deal with, and therefore the present author feels urged to publish without

further delay some of his views on *Tabernamontana*. In the publications indicated above (BOITEAU & SASTRE, 1975, BOITEAU & ALLORGE, 1976) some genera are raised to the rank of tribe and some subgenera and sections to the rank of genus. As the present author knows by experience gained in his investigations on *Gesneriaceae* (LEEUWENBERG 1958, 1959) and *Loganiaceae* (1969, 1971, 1975), it is evident that only after careful study of all species of poorly defined genera the delimitation of these genera eventually may be adjusted. Early name changes, often later to be revoked, cause unnecessary confusion with all other investigators concerned with these plants. In the case of *Tabernamontana* the chemical research, relevant to the fight against cancer, should be kept in mind. The taxonomist PICHON who unfortunately died young reduced the size of many genera of *Apocynaceae* by removing segregates. He was, however, of the opinion that *Tabernamontana* is a large pantropical genus which should only be subdivided into subgenera and sections. The following citation of this paper (PICHON, 1948, p. 231) makes this very clear:

« Il était dangereux de démembrer le genre *Tabernamontana* continent par continent, sans s'assurer, par l'établissement d'une classification générale, que les genres différaient vraiment d'un continent à l'autre. »

As the present author is inclined to underwrite most of his considerations on pp. 230-233, he wants to call special attention to them.

#### CRITICAL REMARKS PRECEDING THE REVISION OF *TABERNÆMONTANA*

In the following paragraph the evaluation of morphological characters only is discussed. The characters mentioned by BOITEAU & ALLORGE (1976) are discussed without phylogenetic or evolutionary speculations. The considerations about the differences of the American and African *Tabernamontana* species pronounced by BOITEAU & ALLORGE are based on very incomplete data. We shall follow them closely and their conclusions are copied here briefly: "*Tabernamontana sensu stricto* occurs only in America. Its leaves are membranaceous and lack intrapetiolar stipules or possess only reduced ones which are adnate to the petiole. The flowers are much smaller than those of the continental African species, with a less thick and tender corolla, and easily dissected; the tube is narrow, not twisted in its basal part. The anthers are inserted in the upper portion of the corolla. The style is 1.5-6 × as long as the clavuncula."

The present author's observations and views are as follows:

The LEAVES of certain American species are coriaceous (e.g. of *T. citrifolia* L., the type species of the genus, *T. coriacea* Link ex R. & S., *T. laurifolia* L., and *T. tetrastachya* H.B.K.). There may be intrapetiolar stipules as in the African species, e.g., in *T. coriacea* and *T. tetrastachya*. The intrapetiolar stipules of these two species are somewhat smaller than those of *T. eglandulosa* Stapf (continental Africa) which are in their turn again



Pl. 1. — 1, *Tabernaemontana holstii* K. Schum. ex Engl. (*Leeuwenberg 10802*; phot. LEEUWENBERG). — 2, *Tabernaemontana* sp. with ovoid, laterally compressed, acuminate, smooth fruits with three longitudinal ridges (*M. Aymonin-Keraudren 25625*, P, Madagascar; phot. M. AYMONIN-KERAUDREN).

slightly smaller than those of *T. crassa* Benth. (continental Africa), *T. eusepala* A.DC. (Madagascar), and *Pagiantha koroana* Markgraf (Asia). They are, however, never free, but always adnate to the bases of the petioles.

The FLOWERS of *T. elegans* Stapf, *T. pachysiphon* Stapf, *T. penduliflora* K. Schum., and *T. ventricosa* Hochst. ex A.DC. (all four from continental Africa) are about as large as those of *T. citrifolia*, *T. coriacea*, *T. retusa* (Lam.) Fichon (Madagascar), *T. aurantiaca* Gaud., and *T. dichotoma* Roxb. (both from Asia), but smaller than those of *T. albiflora* (Miq.) Pulle and *T. undulata* Vahl (both American).

The COROLLA of *T. tetrastachya* is thicker than that of *T. citrifolia*, but certainly not thinner than that of *T. penduliflora*. The corolla tube of *T. coriacea* (America) is twisted at the base in the same way as that of *T. crassa*, *T. eglandulosa*, and *T. penduliflora* (the three from the African continent). The corolla tubes of *T. muelleriana* Mart. (America), *T. ventricosa* (continental Africa), *T. stellata* Fichon (Madagascar), and *T. sphaerocarpa* Blume are less twisted basally, and not at all in, e.g., *T. citrifolia*, *T. pachysiphon*, and *T. retusa* (from America, continental Africa, and Madagascar, respectively).

Not only in several African, but also in some American species the STAMENS are inserted on the lower portion of the corolla tube, e.g., in *T. australis* Müll. Arg. The stamens of *T. pachysiphon* from continental Africa, however, are inserted about the middle of the corolla tube.

The differences between the PISTILS figured in the paper of BOITEAU & ALLORGE (1976) are more or less useful for distinguishing species, but there is no essential difference between the groups raised to the level of genera by them. On the same plate a series of flower buds is figured, on which they also base a subdivision, which, unfortunately, only partly tallies with the text. Bud n° 4 could be placed with buds n°s 8-10, because it is not twisted at the base, either.

The CARPELS of some Madagascan *Tabernaemontana* (*Pandaca* with BOITEAU & ALLORGE, 1976) species are united at the base, but completely syncarpous fruits are not known in these species, nor in any other.

*T. ventricosa* from eastern and southern Africa is, as indicated by BOITEAU & ALLORGE, closely allied to *T. retusa* from Madagascar. Nevertheless they place both species in different genera, respectively *Sarcopharyngia* and *Pandaca*. These two species closely resemble each other in their flowers and fruits.

Several *Tabernaemontana* species from Madagascar show more resemblance to certain American and Asiatic species than to those of continental Africa. This is another reason for comparing all species carefully and for extending the comparison to their ramification systems, which show remarkable regularities. The shape of their fruits should also be taken into account.

In their paragraph « Tendances évolutives et phylogénèse des espèces africaines et malgaches » they fail to mention which shape of pistil occurs in which species, and also 1) to what extent the shape of the pistil is correlat-

ed with the shape of the fruit, 2) to what extent the carpels are united, and 3) if there is any correlation between the shape of the anthers and that of the pistil.

The FRUITS of *Tabernaemontana* always have two carpels which are either completely free or united at the base. There is some variation in the extent to which they are fused, as the present author observed in *T. holstii* K. Schum. ex Engl. (Kenya: Kwale, *Leeuwenberg 10802*, EA, Pharm.-UPS, WAG). The carpels are subglobose, reniform, obliquely ellipsoid, ovoid, or oblong, at the apex rounded, acute, or acuminate, on the surface smooth, verrucose, or muricate, and they may have two or more longitudinal ridges. They are dehiscent along the ventral suture. Subglobose and smooth carpels occur in, e.g., *T. crassa* and *T. holstii* (both from the African continent), *T. aurantiaca* Gaud. and *T. macrocarpa* Jack (both from Asia); subglobose or reniform and verrucose in *Pagiantha koroana* Markgraf and *T. sphaerocarpa* Blume (both Asiatic); reniform and smooth often in *T. undulata* Vahl; obliquely ellipsoid and smooth in, e.g., *T. psychotriifolia* H.B.K. and often in *T. undulata* (both American); obliquely ellipsoid and with 2 faint lateral ridges in *T. ventricosa* Hochst. ex DC.; ovoid, laterally compressed, smooth, and with two or three longitudinal ridges in, e.g., *T. citrifolia* L. and *T. tetrastachya* H.B.K. (both American), *T. eglandulosa* Stapf and *T. glandulosa* (Stapf) Pichon (both from continental Africa), *Pandaca caducifolia* Markgraf and *T. retusa* (Lam.) Pichon (both from Madagascar), *T. mauritiana* Poir. (Mauritius), *T. floribunda* Blume, *T. oligantha* Merr., and *T. pandacaqui* Poir. (Asiatic species); ovoid with two longitudinal ridges and warts in, e.g., *T. elegans* Stapf (African continent); obliquely ellipsoid and verrucose in, e.g., *T. arborea* Rose ex Donn. Sm. and *T. australis* Müll. Arg. (both American) and *Pandaca verrucosa* Markgraf (Madagascar); obliquely ellipsoid and muricate in, e.g., *T. echinata* Aubl. and *T. muricata* Link ex R. & S.; oblong and smooth in, e.g., *T. modesta* Bak. (Madagascar), *T. coronaria* (Jacq.) Willd., and *T. novoguineensis* Scheff. (Asia).

*T. elegans*, the type species of *Leptopharyngia*, is a shrub, like *T. citrifolia*, the type species of *Tabernaemontana*, *T. penduliflora*, the type species of *Camerunia*, and *T. modesta*, the type species of *Hazunia*. The corolla of *T. elegans* resembles that of *T. citrifolia* no less than that of *T. modesta* and *T. mauritiana*, the type species of *Oistanthera* Markgraf, later placed in *Pandaca* by MARKGRAF (1970).

In the next lines of their paper BOITEAU & ALLORGE pay much attention to characters the relative value of which is discussed earlier. Nevertheless, on the basis of these characters they decide on a concept initiated by AUGUSTE DE CANDOLLE that *Tabernaemontana* should be split into genera occurring exclusively in America, continental Africa, Madagascar, or Asia, respectively.

The list of names given as « Tableau I » is an enumeration of errors made by older authors which cannot be considered as a contribution to the knowledge of the taxonomy of the *Apocynaceae*. It should be appended to a revision of the genus as a list of excluded species.

The correct name for the subfamily *Echitoideæ* is *Apocynoideæ* as *Apocynum*, the type genus of the family belongs to it.

Unfortunately the new genera proposed by BOITEAU & ALLORGE are compared with each other in a key, but not with the other genera discussed in their paper.

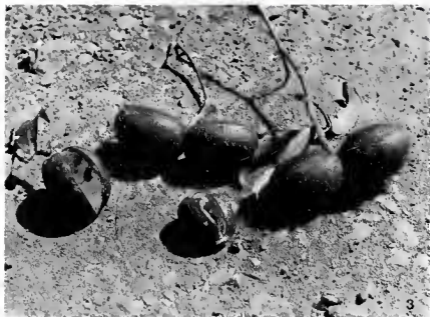
In his survey of the genus *Tabernæmontana* which BOITEAU & ALLORGE erroneously regard as a monograph, PICHON (1949) subdivided the genus into subgenera and sections and under them he listed a great number of species. Unfortunately, due to his early decease, he did not have an opportunity to work out these data, otherwise he probably would have sunk *Hazunta*, *Muntafara*, *Pandacastrum*, and *Ervatania* in *Tabernæmontana*.

*Domkeocarpa* Markgraf and *Ehippiocarpa* Markgraf are very probably synonyms of, respectively, *Tabernæmontana* and *Callichilia* Stapf. *Stemmadenia* Benth. could be well distinguished from *Tabernæmontana* and is probably more closely allied to *Callichilia*. The present author intends to revert to these subjects in later publications.

The following remarks should be made on the paper of BOITEAU & SASTRE (1975). SASTRE studied fresh fruits of *Macoubea* in French Guiana and personally described his very interesting observations to the present author. He observed that the seeds of the latter genus have an aril. BOITEAU & SASTRE stated that *Macoubea* is the only genus of the natural tribe *Ambelanieæ* the aril of which has been correctly observed, as it is often not recognizable in a dry state. As this character has been correctly observed only in *Macoubea*, they find this a reason for placing this genus in a new tribe of the *Tabernæmontanoideæ*, although they suppose that the other genera of the *Ambelanieæ* also have such an aril. This seems a taxonomically dangerous procedure.

*Tabernæmontana* and *Voacanga* Du Petit-Thouars are closely related genera, specimens of which are often confused both in the field and in the herbarium. They differ in their calyces, deciduous in *Voacanga* and persistent in *Tabernæmontana*. The colour of the aril is a not sufficiently safe character for distinguishing these genera, as supposed by BOITEAU & SASTRE. The aril of *Tabernæmontana ventricosa* Hochst. ex A.DC. and that of *Voacanga africana* Stapf are orange, that of *Tabernæmontana crassa* Benth. is whitish and becomes darker, and that of *T. macrocarpa* Jack is red. The following characters are more or less constant and may help to place specimens in the correct genus: the corolla tube of *Voacanga* is about as long as the calyx, whereas that of *Tabernæmontana* is conspicuously longer; the corolla lobes are about as long as wide in *V.* and much longer than wide in *T.*

In the last paragraph of their paper BOITEAU & SASTRE arrive at far-reaching speculations, in which they pose that the *Tabernæmontanææ* of the New World have an origin different from that of the Old World representatives. This is in contradiction with the resemblances observed by the present author when comparing different *Tabernæmontana* species. What, for the rest, the "recent" *Tabernæmontanææ* are, BOITEAU & SASTRE do not mention. They even partly contradict their own theory by attaching



Pl. 2. -- 3, *Tabernaemontana ventricosa* Hochst. ex A. DC. (*Leeuwenberg 11022*, S. Africa, E. Transvaal, km 10 Malelane-Kaalrug, PRE, PRU, WAG; phot. LEEUWENBERG); 4, *Tabernaemontana elegans* Stapf (*Leeuwenberg 11021*, cult. from seeds collected in the wild, S. Africa, E. Transvaal, Nelspruit Bot. Garden, PRE, PRU, WAG; phot. LEEUWENBERG).

*Ervatamia* (containing Asiatic *Tabernaemontana* spp.) and *Hazunta* (with Madagascan *Tabernaemontana* spp.) to American *Tabernaemontana* spp. All *Tabernaemontaneæ* are woody plants and therefore also the "primitives". They occur mostly in forests or thickets. This is also true for *Voacanga*, the shrubs of which are often spared when the bush is cleared for plantations, as they are of medicinal value. This was also observed for various *Rauwolfia* species by the present author in several African countries (Cameroun, Kenya, Tanzania).

BOITEAU & SASTRE call a clavuncula primitive when it is not grooved as in *T. balansæ* Pitard (Asia) and *T. modesta* Bak. (Madagascar). However, they regard the genera *Ervatamia* and *Hazunta* as advanced, where according to them these two species should be placed, respectively.

Finally the present author, after having seen at least some species of most genera involved, supposes that PICHON's (1949) conclusion to reduce the subfamily *Tabernaemontanoideæ* to a tribe, *Tabernaemontaneæ*, in the subfamily *Plumerioideæ*, is far better founded and therefore more acceptable than that of BOITEAU & SASTRE (1975) who raise some genera of the *Tabernaemontanoideæ* to the rank of tribe (e.g. *Voacanga*) and place some genera from other tribes (e.g. *Macoubea*) in newly founded tribes. This causes important changes in the taxonomy and nomenclature of the *Apocynaceæ*, but is founded on observations of only a few characters (for *Macoubea* only a single) in a small number of species.

PROVISIONAL (INCOMPLETE) LIST  
OF THE NAME AND SYNONYMS OF *TABERNAEMONTANA*  
WITH THEIR TYPE SPECIES

**TABERNAEMONTANA L., Sp. Pl. 210 (1753).**

LECTOTYPE SPECIES: *T. citrifolia* L. (designated by BRITTON & WILSON, Scient. Surv. Porto Rico 6 : 89 (1914). Homotypic synonym: Section *Taberna* A. DC.

HETEROTYPIC SYNONYMS: *Pandaca* NORONHA ex DU PETIT THOUARS, Gen. Nov. Madag. 10 (1806); type species: *P. retusa* (LAM.) MARKGRAF (= *T. retusa* (LAM.) PICHON).

— *Conopharyngia* G. DON, Gen. Syst. 4 : 98 (1838). (*C. retusa* (LAM.) G. DON), homotypic synonym of *Pandaca*.

— *Rejoua* GAUD., in FREYCINET, Voy. Uran. Bot. 451 (1826); type species: *R. aurantiaca* (GAUD.) GAUD. (= *T. aurantiaca* GAUD.).

— *Bonafousia* A. DC., Prodr. 8 : 359 (1844); type species: *B. undulata* (VAHL) A. DC. (= *T. undulata* VAHL).

— *Peschiera* A. DC., Lc. : 360; lectotype species: *P. hystrix* (STEUD.) A. DC. (= *T. hystrix* STEUD.; designated by MARKGRAF, Notizbl. Bot. Gart. Berlin 14 : 171, 1938).

— *Taberna* MIERS, Apoc. S. Am. 61 (1878), non A. DC.; lectotype species: *T. discolor* (SW.) MIERS (= *Tabernaemontana discolor* SW.).

— *Anacampta* MIERS, l.c. : 64; lectotype species: *A. congesta* MIERS (= *A. coriacea* (LINK ex R. & S.) MARKGRAF = *T. coriacea* LINK ex R. & S.; designated by MARKGRAF, l.c. : 162).

— *Phrissoctopus* MIERS, l.c. : 71; type species: *P. rigidus* MIERS.

— *Codonentma* MIERS, l.c. : 72; type species: *C. calycina* MIERS (= *T. muelleriana* MART.).



- *Merizadenia* MIERS, l.c. : 78; lectotype species: *M. sananho* (RUIZ & PAVÓN) MIERS (= *T. sananho* RUIZ & PAVÓN; designated by MARKGRAF, l.c. : 166).
- *Anartia* MIERS, l.c. : 79; lectotype species: *A. flavicans* (R. & S.) MIERS (= *T. flavicans* R. & S.; designated by MARKGRAF, l.c. : 165).
- *Ochronerium* BAILL., Bull. Soc. Linn. Paris 1 : 771 (1889); type species: *O. humblotii* BAILL. (= *T. humblotii* (BAILL.) PICHON).
- *Gabunia* K. SCHUM., in ENGLER, Bot. Jahrb. 23 : 224 (1896); lectotype species: *G. crispiflora* (K. SCHUM.) STAFF (= *T. crispiflora* K. SCHUM.; designated by BULLOCK, Kew Bull. 15 : 395, 1962).
- *Ervatamia* (A. DC.) STAFF, in Fl. Trop. Afr. 4 (1) : 126 (1902); type species: *E. coronaria* (JACQ.) STAFF (= *T. coronaria* (JACQ.) WILLD.
- *Pagiantha* MARKGRAF, Notizbl. Bot. Gart. Berlin 12 : 549 (1935); type species: *P. dichotoma* (ROXB.) MARKGRAF (= *T. dichotoma* ROXB.).
- *Oistanthera* MARKGRAF, l.c. : 550; type species: *O. telfairiana* (WALL.) MARKGRAF (= *T. telfairiana* WALL. = *T. mauritiana* POIR.; later in MARKGRAF as *Pandaca mauritiana* (POIR.) MARKGRAF, 1970).
- *Testudipes* MARKGRAF, l.c.; type species: *T. recurva* (ROXB.) MARKGRAF (= *Tabernaemontana recurva* ROXB.).
- *Stenosolen* MARKGRAF, in PULLE, Fl. Suriname 4 (1) : 455 (1937); type species: *S. heterophyllus* (VAHL) MARKGRAF (= *T. heterophylla* VAHL).
- *Taberna* MARKGRAF, Notizbl. Bot. Gart. Berlin 14 : 166 (1938), non A. DC., nec MIERS; type species: *T. albiflora* (MIQ.) MARKGRAF (= *Tabernaemontana albiflora* (MIQ.) PULLE).
- *Hazunta* PICHON, Not. Syst. 13 : 207 (1948); type species: *H. modesta* (BAK.) PICHON (= *T. modesta* BAK.).
- *Mantafara* PICHON, l.c. : 209; type species: *M. sessilifolia* (BAK.) PICHON (= *T. sessilifolia* BAK.).
- *Pandacastrum* PICHON, l.c. : 209; type species: *P. saccharatum* PICHON.
- *Sarcopharyngia* (STAFF) BOITEAU, Adansonia, ser. 2, 16 (2) : 272 (1976); type species: *S. ventricosa* (HOCHST. ex A. DC.) BOITEAU (= *T. ventricosa* HOCHST. ex A. DC.).
- *Camerunia* (PICHON) BOITEAU, l.c. : 274; type species: *C. penduliflora* (K. SCHUM.) BOITEAU (= *T. penduliflora* K. SCHUM.).
- *Leptopharyngia* (STAFF) BOITEAU, l.c. : 276; type species: *L. elegans* (STAFF) BOITEAU (= *T. elegans* STAFF).
- *Protogabunia* BOITEAU, l.c. : 276; type species: *P. letestui* (PELEGR.) BOITEAU (= *T. letestui* (PELEGR.) PICHON).

NOTE: Some species have been described in genera not maintained by the present author and have, moreover, not yet been combined with *Tabernaemontana*. New combinations will eventually be made, when the revision of the genus shows them to be valid species.

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